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Jane Case-Smith

Ohio State University

Heather Miller-Kuhaneck

Sacred Heart University, kuhaneckh@sacredheart.edu

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Occupational Therapy With Children With Pervasive Developmental Disorders

Jane Case-Smith, Heather Miller

Key Words: autism • intervention process, occupational therapy

Objective. Although the prevalence of children with pervasive developmental disorders (PDD) has increased, empirical data about the role and practices of occupational therapists have not been reported in the literature. This descriptive study investigated the practice of occupational therapists with children with PDD.

Method. A survey was mailed to 500 occupational therapists in the Sensory Integration Special Interest Section or School System Special Interest Section of the American Occupational Therapy Association in eastern and midwestern United States. The valid return rate was 58% (292 respondents). The survey used Likert scale items to measure frequency of performance problems observed in children with PDD, performance areas addressed in intervention, perceived improvement in performance, and frequency of use of and competency in intervention approaches.

Results. The respondents primarily worked in schools and reported that in the past 5 years they had served an increasing number of children with PDD. Most respondents provided direct services and appeared to use holistic approaches in which they addressed multiple performance domains. They applied sensory integration and environmental modification approaches most frequently and believed that they were most competent in using these approaches. Respondents who reported more frequent use of and more competence in sensory integration approaches perceived more improvement in children's sensory processing. Respondents who reported more frequent use of and more competence in child-centered play perceived more improvement in children's sensory integration and play skills.

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The term *pervasive developmental disorders* (PDD) describes a range of conditions that are characterized by global developmental delays, particularly in communication and social interaction. Included in this range is autism, Asperger's syndrome, Rett syndrome, and PDD not otherwise specified. Prevalence of PDD is reported as 1.5 in 1,000 (Feinberg & Beyer, 1998). Experts in PDD agree that the number of children with this condition has increased in recent years (Dawson & Osterling, 1996; Greenspan & Wieder, 1997a).

Characteristics of Children With PDD

Children with PDD typically demonstrate deficits in the areas of language and communication, social skills, play skills, praxis, cognitive abilities, and attention (American Psychiatric Association [APA], 1994). In addition, they often exhibit sensory processing difficulties and stereotypic motor patterns and behavior (Baranek, Foster, & Berkson, 1997; Kientz & Dunn, 1997; Ornitz, 1974). Predominant

Jane Case-Smith, EdD, OTR/L, BCP, is Associate Professor, The Ohio State University, 406 SAMP, 1583 Perry Street, Columbus, Ohio 43210; Case-smith.1@osu.edu

Heather Miller, MS, OTR/L, BCP, is Occupational Therapist, 64 Coe Road, Durham, Connecticut.

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areas of concern in children with autism are dysfunction in reciprocal interaction and the lack of symbolic communication (APA, 1994). Children with PDD exhibit specific difficulties in orienting to social stimuli, impoverished social gaze, and impairments in shared attention and motor initiation (Dawson & Osterling, 1996). Because children with PDD have difficulty using flexible and abstract thinking as required in ambiguous social situations, they lack understanding of emotional expressions (Huebner, 1992). Some of these children appear completely self-absorbed; however, most demonstrate some ability to engage and interact, generally using simple gestures to meet basic needs (e.g., to request food or drink).

Although primary dysfunction occurs in language, communication, and social interaction, other performance areas are also affected (APA, 1994). Most children with PDD have cognitive impairments that affect their learning. Young children tend to demonstrate stereotypic play patterns rather than complex imaginative, pretend play. Later, in school, they exhibit an overreliance on routine and require highly structured learning environments. Learning is promoted with modeling and repetitions. Visual-spatial abilities are generally stronger than auditory processing, and often children with PDD learn best through visual modes (Greenspan & Wieder, 1997a).

Related to the difficulties in cognition, communication, and play are problems in sensory modulation (Baranek et al., 1997; Kientz & Dunn, 1997; Wieder, 1996). Frequently, children with PDD demonstrate a high neural threshold for registering sensory input. As a result, they are underreactive to sensation and may appear self-absorbed and passive. Other children with a high threshold for sensory input seem to crave sensation, seeking high levels of sensory input at every opportunity. Children with autism are also reported to be overly reactive to sensation, exhibiting sensory defensiveness and low tolerance of sensory stimulation. In an extensive chart review of 200 children with autism, 95% exhibited sensory modulation difficulties (Greenspan & Wieder, 1997a).

Intervention Programs for Children With PDD

Because children with PDD can have extensive problems in communication, social relationships, sensory modulation, perception, and cognition, an interdisciplinary, comprehensive intervention program is appropriate. Specialized approaches and techniques have been developed (Dawson & Osterling, 1996), many of which follow behavioral approaches. For example, the Young Autism Program (Lovaas, 1987) uses applied behavior analysis to design individualized programs in which children receive intensive one-to-one trial training for 40 hr per week. In the TEACCH curriculum (Lord & Schopler, 1994; Schopler, Mesibov, & Harsey, 1995), children are taught new, developmentally appropriate skills in structured one-on-one instruction. As the skill is learned, the children are taught

to use it with intermittent adult support, thereby supporting the child's independence.

Less structured and less intensive intervention is provided in inclusive educational programs that emphasize peer support and developmental approaches (Strain & Cordisco, 1993; Strain, Wolery, & Izeman, 1998). Early childhood education programs place emphasis on children with PDD learning in daily routines and provide opportunities for generalizing learning to a variety of environments (Strain et al., 1998).

A model based on child-centered play, relationships, and affective interaction (Greenspan, 1992; Wieder, 1996) recognizes that the child's behaviors are secondary to biologically based processing difficulties (e.g., auditory processing, sensory processing and modulation, motor planning). This intervention is designed to improve the child's ability to relate, particularly with the primary caregivers, and to develop language and higher level symbolic play through these interaction opportunities (Greenspan & Wieder, 1997b).

Other intervention approaches include those that provide auditory integration training to promote general alertness and attention (Frick & Lawton-Shirley, 1994) and those that focus on the child's ability to selectively attend to social stimuli, including facial expressions and gestures (Dawson & Osterling, 1996).

Research about the scope of occupational therapy practice with children who have PDD is minimal. Play-based interventions have been reported (Restall & MacGill-Evans, 1994) and sensory integration approaches have been applied (Ayres & Tickle, 1980; Baranek, 1998). The emphasis of these occupational therapy approaches has been to promote the child's ability to modulate sensory input, to reduce sensory defensiveness, and to help the child better interact with his or her environment. Specifically, practitioners help to adapt the child's daily sensory environment so that he or she is better able to modulate sensory input. Occupational therapy practitioners serve these children in both clinical and school-based settings (Baranek et al., 1997; Greene, 1995); however, data on the prevalence of children served and the intervention approaches used are lacking.

Purpose

This survey study investigated the practice of occupational therapists with children with PDD. The goal was to describe the types of performance and functional problems observed in these children, the frequency with which those issues are addressed in intervention, the types of service delivery and intervention approaches used, and the therapists' perceived competency in these approaches. A secondary purpose was to explore the relationships among the variables that characterize occupational therapy practice and the perceived improvements in the children's performance.

Method

Sample

A random sample of 500 occupational therapists who were members of the American Occupational Therapy Association's (AOTA's) School System Special Interest Section or Sensory Integration Special Interest Section was selected. These two Special Interest Sections were selected to get a broad representation of pediatric occupational therapists. The sample represented the eastern and midwestern United States. Of the 500 surveys mailed, 309 were returned and 292 were usable (i.e., respondents indicated that they worked with children). The return rate was 62%, and valid return rate was 58%.

Instrument

The questionnaire was drafted by the authors based on review of the literature, the research objectives, and a table of specifications. The questionnaire consisted of 6 items requesting demographic information followed by 8 sections with multiple related questions that rated frequency, significance, or competency using a 5-point Likert scale (Portney & Watkins, 1993). Therapists were asked to rate the frequency with which they observed certain functional problems in the children with PDD on their caseload, the frequency with which they addressed those problems, and the extent to which improvements in specific areas were observed. PDD was defined as children with autism, Asperger's syndrome, and developmental delay with autistic-like behaviors. The respondents also were to indicate the frequency with which they used specific models of service delivery and intervention approaches and to rate their competency in these approaches.

The questionnaire was piloted using 10 occupational therapists with a mean of 12 years (range = 6 years–23 years) of experience in school-based practice. The pilot indicated that the survey required 15 to 20 min to complete. The field test resulted in clarification in language and changes in format. After revision, the final survey was mailed in May 1997.

Data Analysis

Frequencies, means, and percentages for all variables were computed. Internal consistency for each survey section was estimated using Cronbach alpha coefficients. The coefficients were high for each section (ranged = .72 – .90); therefore, for certain analyses, items within a section were combined. Pearson correlation coefficients were computed to estimate relationships among the variables.

Results

Sample

The average years of experience for the 292 respondents was 11.12 years ($SD = 7.2$). Information about their work set-

Table 1
Descriptive Data About Survey Respondents

Employment Characteristic	Valid %
Work setting	
School	66
Preschool or early intervention	18
Hospital	4
Home	3
Outpatient facility	9
Geographic area	
Rural	26
Urban	26
Suburban	48
Percentage of caseload with diagnosis of pervasive development disabilities	
0–5	31
6–10	33
11–25	20
26–50	11
> 50	5

tings, geographic area, and percentage of caseload with PDD is listed in Table 1. Most of the respondents (61%) indicated that the percentage of children with autism had increased in the past 5 years; only 2% indicated that it had decreased.

Performance and Functional Problems and Intervention

Using a Likert scale of 1 (never) to 5 (always), the respondents indicated frequency of functional performance problems and frequency of intervention for those problems in their clients with PDD. Means and standard deviations for each domain are listed in Table 2.

Sensory integration problems were often seen in these children, and respondents observed frequent difficulty in sensory modulation, tactile function, and vestibular func-

Table 2
Frequency of Problems Observed and Frequency Addressed in Intervention

Performance Domain	Performance Area			
	Problems Observed		Addressed	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Cognition				
Attention	4.47	.55	4.39	0.81
Cognition and language	4.54	.63	3.93	0.84
Sensory integration				
Sensory modulation	4.39	.59	4.48	0.59
Tactile function	4.03	.59	4.39	0.62
Vestibular function	3.87	.71	4.24	0.71
Body awareness	3.92	.63	4.22	0.73
Visual perception	3.45	.72	3.97	0.80
Motor function				
Fine motor	3.89	.77	4.29	0.72
Gross motor	3.49	.79	3.75	0.85
Balance	3.40	.72	3.65	0.84
Motor planning	3.94	.76	4.17	0.72
Socioemotional function				
Eye contact	4.20	.68	4.01	0.92
Interaction with adult	4.11	.69	4.05	0.83
Interaction with peers	4.42	.70	3.70	0.87
Play				
Purposeful	4.05	.76	4.16	0.77
Imitative	3.87	.76	3.91	0.86
Pretend	4.03	.84	3.41	1.00
Social	4.38	.76	3.67	0.98
Self-care				
Feeding	3.23	.82	3.38	0.92
Dressing	3.58	.75	3.54	0.85
Community life skills	4.07	.79	3.18	1.02

Note. 1 = never; 5 = always.

tion. Problems in body awareness were also often observed. The sensory integration problems were frequently addressed in occupational therapy intervention. For example, 95% of the respondents often or always provided services to improve sensory modulation. Vestibular system and tactile system function were addressed often or always by 84% and 92% of the respondents.

The respondents also observed problems in motor function, although they presented less frequently than sensory integration problems. Eighty-nine percent frequently observed motor planning problems, and two thirds (65% to 67%) often or always observed other types of motor problems. These motor problems were often addressed in occupational therapy intervention. Motor planning and fine motor were most often intervention goals.

Socioemotional problems are generally considered to be part of autism and PDD. Lack of eye contact was frequently observed in these children. Problems in interaction with peers were slightly more frequent (93% indicated always or often) than with adults (83% indicated always or often). Occupational therapists “sometimes to always” intervened for socioemotional problems. Their intervention addressed interaction with adults and less often interaction with peers. Only 4% to 9% of the respondents rarely or never included these goals.

In addition to investigating which performance components were included in occupational therapy intervention, two functional areas were explored: play and self-care. Of these broad areas, play was a more frequent problem than self-care in respondents’ clients with PDD. Social play was the most significant problem. The respondents often provided intervention to develop play skills, indicating that play is an important priority in intervention and that most of the therapists provided services that addressed the children’s play skills. In the domain of self-care, feeding and hygiene were sometimes a problem. Most respondents (88%) observed problems in development of community life skills. Respondents placed less emphasis on self-care than other performance or functional areas. See Figure 1 for a visual comparison of these domains.

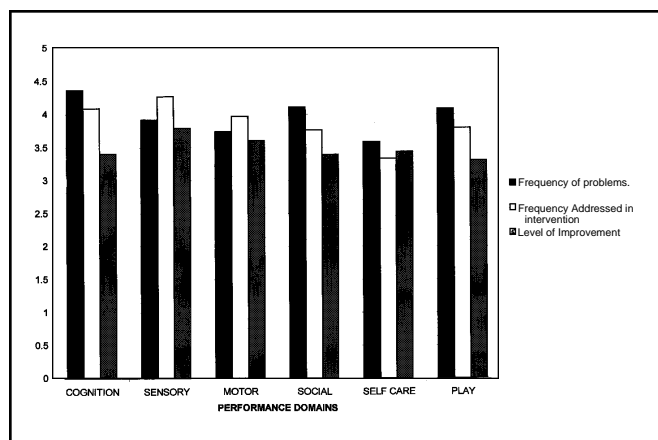


Figure 1. Performance problems, intervention, and perceived improvement.

Table 3
Reported Improvement in Domain Areas

Domain	<i>M</i>	<i>SD</i>
Cognition	3.40	.61
Sensory function	3.79	.59
Motor function	3.60	.60
Socioemotional interaction	3.39	.62
Self-care	3.43	.71
Play	3.30	.70

Note. 1 = no improvement; 5 = significant improvement.

Performance and Functional Improvements

Given these emphases in intervention, the respondents indicated that they observed the most significant improvements in sensory processing (see Table 3). The skills that were reported to improve least were cognition and learning, pretend play, and social play, indicating that the children continued to have problems in these performance and functional areas throughout the course of intervention.

Intervention Approaches

Two intervention approaches were frequently used by the respondents: a sensory integration approach and environmental modification (see Figure 2 and Table 4). These approaches were used sometimes to always by 95% and 97% of the sample. Child-centered play (Greenspan, 1992) was used sometimes to always by 87% of the respondents. Moderate significant correlations (ranged = .25–.31) among these three approaches suggested that therapists used them together and found them to be complementary. The respondents also used behavioral analysis sometimes to often; and cognitive training was used rarely to sometimes. A significant correlation between frequency of use of cognitive training and behavior analysis ($r = 0.37, p < .001$) suggested that these approaches were used together.

Respondents believed that they had adequate or better skills in all of the approaches listed on the survey, but 39% indicated that they needed assistance to implement a cognitive training approach. They reported greatest expertise in sensory integration (69%) and in environmental modification (59%).

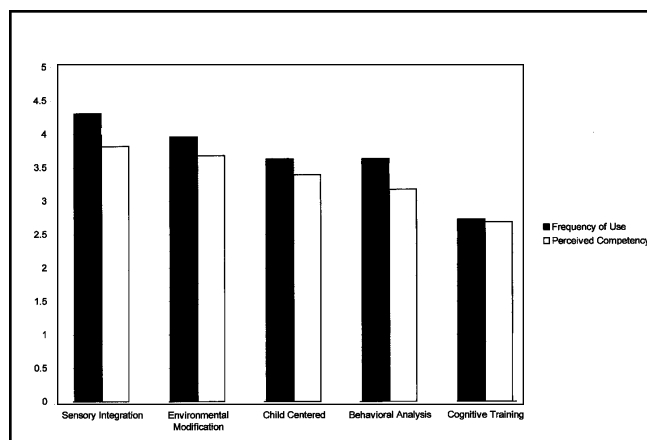


Figure 2. Frequency of use and perceived competency in intervention approaches.

Table 4
Frequency and Competency in Intervention Approaches

Approach	Frequency ^a		Competency ^b	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Behavior analysis and management	3.63	.86	3.17	.80
Cognitive training	2.72	.97	2.69	.91
Sensory integration	4.31	.68	3.82	.75
Child-centered play	3.63	.96	3.39	.90
Environmental modification	3.96	.81	3.68	.76

^a1 = never; 5 = always. ^b1 = needs assistance; 5 = expert.

Correlations Among Models of Service Delivery, Intervention Approaches, and Child's Improvement

Service delivery models had low but significant relationships with the degree of improvement observed in the children with autism. Frequency of direct services correlated with respondents' perceived improvement in sensory integration ($r = .177, p = .003$), but did not correlate with improvement in any other performance area. Use of consultation had a low correlation with perceived improvement in sensory integration ($r = .132, p = .03$) and with improvement in self-care ($r = .175, p = .004$).

Low to moderate relationships were observed between the intervention approaches that the respondents used and the improvements they observed. Behavioral analysis approaches correlated with reported improvement in self-care ($r = .177, p = .003$). Frequency of use of cognitive training was positively related to improvement in all areas, but particularly social function ($r = .250, p < .001$), self-care ($r = .231, p < .001$) and play ($r = .222, p < .001$). Use of sensory integration approaches had a moderate relationship with improvement in sensory integration ($r = .423, p < .001$) and a low but significant relationship with social skills ($r = .242, p < .001$). Therapists who used child-centered play more often reported improvement in social skills ($r = .327, p < .001$) and play skills ($r = .314, p < .001$).

Perceived competency in different approaches demonstrated low to moderate correlation with improvement in performance and function. For example, the respondents' perceived competence in sensory integration approaches related to children's improvement in sensory integration performance ($r = .325, p < .001$). Therapists who reported greater expertise in child-centered play reported more improvement in social skills ($r = .332, p < .001$) and play skills ($r = .238, p < .001$). Competence in environmental adaptation related to reported improvement in self-care ($r = .231, p < .001$). Therapists who reported more competence in cognitive training indicated that the children on their caseload improved more in every performance area but primarily in social skills ($r = .300, p < .001$) and cognitive skills ($r = .311, p < .001$). Competency in behavioral analysis related to self-care improvement ($r = .182, p = .003$) and improvement in play skills ($r = .175, p = .004$).

Discussion

Occupational therapists provide services to an increasing number of children with PDD and autism. More than two thirds of the 292 occupational therapists surveyed indicat-

ed that at least 1 in 10 of the children they served had PDD. With the increasing prevalence (Feinberg & Beyer, 1998), practitioners need to understand the performance and occupational problems incurred by children with PDD and to develop competency in the intervention approaches advocated for these children.

Performance and Functional Problems and Intervention

The occupational therapist respondents concur with the literature from other fields that children with PDD demonstrate problems in multiple performance areas (Feinberg & Beyer, 1998; Greenspan & Weider, 1997a; Koegel & Koegel, 1995; Weider, 1996). The functional problems observed most often by the respondents were in pretend and social play and in interactions with peers; fewer problems were observed in self-care. Children with PDD have difficulty in creative and imaginative play, particularly in adapting to a playful situation with peers. Most play behaviors are spontaneous, varied, and complex, depending on who and what is present in the environment. Spontaneous, complex, and imaginative behaviors required for play are quite difficult for children with PDD as was reported by the survey respondents and the literature (Greenspan, 1992; Huebner, 1992; Restall & Magill-Evans, 1994). Children with PDD seem better able to learn routines and rote behaviors that are required in most self-care activities.

Many performance components are affected in PDD; the greatest problems reported by respondents were in attention, cognition and language, sensory modulation, and tactile processing, with fewer problems in motor skills, visual perception, and balance. The performance problems observed by these occupational therapist respondents match those reported by psychologists, psychiatrists, and educators (APA, 1994; Greenspan & Wieder, 1997a; Koegel & Koegel, 1995; Wieder, 1996). In concurrence with Wieder (1996) and Greenspan (1992), the respondents identified problems in sensory processing and motor planning with relative strengths in visual perception.

The respondents reported that they addressed all of these performance areas in their intervention, suggesting that they used holistic approaches. Although occupational therapists in schools typically focus on sensory-motor-perceptual goals (Swart, Kanny, Massagli, & Engel, 1997), the respondents addressed all performance impairments and the global functional issues associated with those impairments. These results suggest that they used integrated intervention strategies and activities that consider all aspects of performance. Holistic approaches are particularly appropriate given the multiple areas of involvement and evidence that use of singular intervention modalities do not produce generalized beneficial effects on children with autism (Schreibman, 1988; Strain et al., 1998).

The respondents most often focused on sensory integration problems, a role that concurs with the literature

(Baranek, 1998; Baranek et al., 1997; Case-Smith, 1997; Reisman, 1993). In these children, motor problems are believed to be linked to sensory processing problems. Motor planning, which is thought to reflect both cognitive and sensory processing (Ayres, 1985; Parham & Mailloux, 1996), was the primary problem observed by the respondents. This finding concurred with those of other authors (e.g., Greenspan & Wieder, 1997a; Huebner, 1992; Wieder, 1996). Although motor planning is a problem for many children with PDD, motor skills can also be an asset, and certain children with PDD have good to excellent dexterity, manipulation, and balance (Shahmoon-Shanok, 1992).

The respondents indicated that children with PDD have particular problems in interacting with peers and engaging in social play. They addressed both of these issues in their intervention, although more often the respondents intervened to promote interaction with adults than with peers. These results suggest that occupational therapists recognize but do not always address peer interaction, perhaps because they often provide one-on-one services ($M = 4.18$, $SD = .56$) and only sometimes use a small group format ($M = 3.13$, $SD = 1.08$).

Creating a social environment in which children with autism can learn requires coordination among the professionals and support of the child's peers to enter and sustain play situations (McEvoy, Odom, & McConnell, 1992; Schwartz, Billingsley, & McBride, 1998; Strain et al., 1998). Peers are less tolerant of atypical behavior than adults. The teachers and other adults in the classroom tend to initiate interactions with their students and then work to sustain that interaction. Because peers do not understand the atypical or withdrawal behaviors of children with autism (Odom, McConnell, & McEvoy, 1992), it is important that therapists support peer interaction and include peers in their intervention when appropriate.

In general, respondents observed improvements in the children with PDD on their caseload, although improvement was not always described as significant. Greenspan and Wieder (1997a) found that 83% of the 200 children with PDD who received direct intervention services demonstrated significant improvement in most domains. The children in this study who exhibited a minimal to moderate degree of impairment frequently achieved functional levels of play and appropriate social interactions. Children with severe pervasive development disorders (17%) tended to continue to demonstrate pervasive problems and low levels of performance (Greenspan & Wieder, 1997a). Our respondents reported that about 20% of the children with PDD made relatively little progress in cognitive and play skills and continued to have problems even with intervention. The reported improvements in sensory integration, most often in sensory modulation and tactile processing, may indicate that sensory processing is the domain in which children made greatest gains or may indicate that the respondents were more aware of gains in these

areas because of their focus on sensory processing issues.

Intervention Approaches

The respondents primarily provided direct services to children with PDD, suggesting that they are core members of the teams that serve these children. They also provided frequent consultation to other team and family members. The intervention approaches provided most often were sensory integration and environmental modification. These two approaches were also the ones in which the respondents felt most competent. Sensory integration approaches are part of the entry-level training of occupational therapists, and most pediatric therapists attain additional training in sensory integration theory and techniques (Parham & Mailloux, 1996; Williamson & Anzalone, 1997). Use of the sensory integrative approach with children with autism has resulted in performance gains (Ayres & Tickle, 1980; Frick & Lawton-Shirley, 1994). The correlation between use of sensory integration and environmental modification approaches suggests that these approaches were applied together. Use of a sensory integration approach in making recommendations for adapting the environment is an important role of occupational therapists in schools (Haack & Haldy, 1998) and early intervention (Humphry & Link, 1990). If the environment is modified, children with sensory modulation problems can better cope with and attend to their environment (Baranek, 1998; Haack & Haldy, 1998; Williamson & Anzalone, 1997).

Respondents' use of a sensory integration approach also related to implementation of a child-centered approach, suggesting that these two approaches are compatible. Greenspan and Wieder (1997a) and Greenspan (1992) recommended that child-centered play include specific activities to meet the sensory integration needs of the child. Ayres (1972) and her colleagues (e.g., Koomar & Bundy, 1991) believed that child-centered activity is an essential aspect of intervention using a sensory integration approach. When using a sensory integration approach, therapists create activities that "tap the client's inner drive and promote the client's self direction and growth" (Koomar & Bundy, 1991; p. 252). Hence, some authors view child-centered activity to be inherent in a sensory integration approach. The correlation between the reported use of these approaches is not sufficiently strong to reflect that these approaches are one and the same, but does suggest that the respondents viewed them to be compatible.

The prevalence of sensory integration and environmental modification among the occupational therapy respondents contrasts with the approaches used by professionals in other disciplines who often emphasize behavioral approaches (Dawson & Osterling, 1996; Feinberg & Beyer, 1998; Lovaas, 1987) and developmental or functional approaches (Strain & Cordisco, 1993; Noonan & McCormick, 1993). Schwartz et al. (1998), in defining best practice for preschool children with autism, explained

that intervention strategies for children with PDD can be categorized as either developmental or behavioral. Review of literature on intervention programs for these children suggests that occupational therapists' emphasis on sensory integration may make a unique contribution to programs for these children.

Limitations

The study was limited by sample size and sampling was restricted to members of AOTA's School System Special Interest Section and Sensory Integration Special Interest Section. Members of other special interest sections may also work with children and their inclusion of this group would expand the generalizability of the results. The intervention approaches listed on the survey were not specifically defined, which may have created confusion for the respondents. Although the written comments from the pilot and study's sample did not indicate confusion, respondents may have interpreted the survey's terms differently than the researchers' intent.

Summary

The number of children with autism and PDD in occupational therapists' caseloads has increased in the past 5 years. This description of practice revealed that occupational therapists who provide services to children with PDD primarily provide direct services and appear to use holistic approaches in which they address multiple performance and functional domains. They apply sensory integration and environmental modification approaches most frequently and feel most competent in using these approaches. Therapists who reported more frequent use of and more competence in a sensory integration approach perceived more improvement in children's sensory processing abilities. Therapists who reported more frequency use of and more competence in a child-centered play approach perceived more improvement in children's sensory integration and play skills. These relationships suggest that further empirical study of these approaches using experimental design is warranted. ▲

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